

What is claimed is:

- 1           1.     A method of providing weighted grammars for speech recognition in a  
2     vehicle navigation system, the method comprising:  
3                 receiving grammar for speech recognition, the grammar including a  
4                         plurality of tokens;  
5                 receiving geographical information corresponding to the tokens; and  
6                 calculating weights corresponding to the tokens based upon the  
7                         geographical information.
- 1           2.     The method of claim 1, wherein the geographical information includes  
2     sizes of locations corresponding to the tokens and each of the weights associated with  
3     each token is affected by the location corresponding to each token.
- 1           3.     The method of claim 1, wherein the geographical information includes  
2     populations of locations corresponding to the tokens and each of the weights associated  
3     with each token is affected by the population of the location corresponding to each token.
- 1           4.     The method of claim 1, wherein the geographical information includes  
2     popularity of locations corresponding to the tokens and each of the weights associated  
3     with each token is affected by the popularity of the location corresponding to each token.
- 1           5.     The method of claim 1, further comprising:  
2                 receiving location information indicating the location of a vehicle for  
3                         which the vehicle navigation system is used, the weights being

4                               calculated based upon the location information as well as the  
5                               geographical information.

1           6.       The method of claim 5, wherein the geographical information includes  
2       distances between the vehicle location and the locations corresponding to the tokens and  
3       each of the weights associated with each token is affected by the corresponding distances.

1           7.       The method of claim 5, wherein the geographical information includes  
2       distances between the vehicle location and locations corresponding to the tokens and the  
3       size of the locations corresponding to the tokens, and the weight (W) associated with  
4       each of the tokens is calculated by:

5           
$$W = SG / (Dcg + C),$$

6       where SG is the size of the location corresponding to the token, Dcg is the distance from  
7       the vehicle location to the location corresponding to the token, and C is a predetermined  
8       constant.

1           8.       The method of claim 5, wherein the geographical information includes  
2       distances between the vehicle location and locations corresponding to the tokens and the  
3       population of the locations corresponding to the tokens, and the weight (W) associated  
4       with each of the tokens is calculated by:

5           
$$W = PG / (Dcg + C),$$

6       where PG is the population of the location corresponding to the token, Dcg is the distance  
7       from the vehicle location to the location corresponding to the token, and C is a  
8       predetermined constant.

1           9.     The method of claim 5, wherein the geographical information includes  
2     distances between the vehicle location and locations corresponding to the tokens and the  
3     size and population of the locations corresponding to the tokens, and the weight (W)  
4     associated with each of the tokens is calculated by:

5           
$$W = (SG + PG) / (Dcg + C),$$

6     where SG is the size of the location corresponding to the token, PG is the population of  
7     the location corresponding to the token, Dcg is the distance from the vehicle location to  
8     the location corresponding to the token, and C is a predetermined constant.

1           10.    The method of claim 5, wherein the geographical information includes  
2     distances between the vehicle location and locations corresponding to the tokens and the  
3     size, population, and the popularity indices of the locations corresponding to the tokens,  
4     and the weight (W) associated with each of the tokens is calculated by:

5           
$$W = (SG + PG + IG) / (Dcg + C),$$

6     where SG is the size of the location corresponding to the token, PG is the population of  
7     the location corresponding to the token, IG is the popularity index of the location  
8     corresponding to the tokens, Dcg is the distance from the vehicle location to the location  
9     corresponding to the token, and C is a predetermined constant.

1           11.    The method of claim 1, further comprising:  
2                    comparing input speech with the tokens;  
3                    generating confidence scores corresponding to the tokens based upon the  
4                    comparison; and

5                    modifying the confidence scores based upon the weights associated with  
6                    the tokens.

1            12.    The method of claim 11, wherein modifying the confidence scores  
2    comprises multiplying the confidence scores by their associated weights.

1            13.    A method of speech recognition, the method comprising:  
2                    receiving tokens in grammar and weights associated with the tokens, the  
3                    weights being derived by information on a location and  
4                    geographical information corresponding to the tokens;  
5                    comparing input speech with the received tokens;  
6                    generating confidence scores corresponding to the tokens based upon the  
7                    comparison; and  
8                    modifying the confidence scores based upon the weights associated with  
9                    the tokens.

1            14.    The method of claim 13, wherein modifying the confidence scores  
2    comprises multiplying the confidence scores by their associated weights.

1            15.    A speech recognition system for use in a vehicle navigation system, the  
2    speech recognition system comprising:  
3                    a grammar database storing grammars including tokens corresponding to  
4                    parts of addresses;  
5                    a geographical information database storing geographical information  
6                    corresponding to the tokens; and

7 a grammar generator selecting one or more of the tokens and assigning  
8 weights to the selected tokens, the weights being determined based  
9 upon the geographical information.

1 16. The speech recognition system of claim 15, wherein the geographical  
2 information includes sizes of locations corresponding to the tokens and each of the  
3 weights associated with each token is affected by the location corresponding to each  
4 token.

1 17. The speech recognition system of claim 15, wherein the geographical  
2 information includes populations of locations corresponding to the tokens and each of the  
3 weights associated with each token is affected by the population of the location  
4 corresponding to each token.

1 18. The speech recognition system of claim 15, wherein the geographical  
2 information includes popularity of locations corresponding to the tokens and each of the  
3 weights associated with each token is affected by the popularity of the location  
4 corresponding to each token.

1 19. The speech recognition system of claim 15, wherein the weights are  
2 further determined based upon the location of a vehicle for which the vehicle navigation  
3 system is used.

1 20. The speech recognition system of claim 19, wherein the geographical  
2 information includes distances between the vehicle location and the locations

3 corresponding to the tokens and each of the weights associated with each token is  
4 affected by the corresponding distances.

1 21. The speech recognition system of claim 19, wherein the geographical  
2 information includes distances between the vehicle location and locations corresponding  
3 to the tokens and the size of the locations corresponding to the tokens, and the weight  
4 (W) assigned to each of the token is calculated by:

5 
$$W = SG / (Dcg + C),$$

6 where SG is the size of the location corresponding to the token, Dcg is the distance from  
7 the vehicle location to the location corresponding to the token, and C is a predetermined  
8 constant larger than zero.

1 22. The speech recognition system of claim 19, wherein the geographical  
2 information includes distances between the vehicle location and locations corresponding  
3 to the tokens and the population of the locations corresponding to the tokens, and the  
4 weight (W) assigned to each of the tokens is calculated by:

5 
$$W = PG / (Dcg + C),$$

6 where PG is the population of the location corresponding to the token, Dcg is the distance  
7 from the vehicle location to the location corresponding to the token, and C is a  
8 predetermined constant larger than zero.

1 23. The speech recognition system of claim 19, wherein the geographical  
2 information includes distances between the vehicle location and locations corresponding  
3 to the tokens and the size and population of the locations corresponding to the tokens, and  
4 the weight (W) assigned to each of the tokens is calculated by:

5            $W = (SG + PG) / (Dcg + C),$

6   where SG is the size of the location corresponding to the token, PG is the population of  
7   the location corresponding to the token, Dcg is the distance from the vehicle location to  
8   the location corresponding to the token, and C is a predetermined constant larger than  
9   zero.

1           24.   The speech recognition system of claim 19, wherein the geographical  
2   information includes distances between the vehicle location and locations corresponding  
3   to the tokens and the size, population, and the popularity indices of the locations  
4   corresponding to the tokens, and the weight (W) assigned to each of the tokens is  
5   calculated by:

6            $W = (SG + PG + IG) / (Dcg + C),$

7   where SG is the size of the location corresponding to the token, PG is the population of  
8   the location corresponding to the token, IG is the popularity index of the location  
9   corresponding to the token, Dcg is the distance from the vehicle location to the location  
10   corresponding to the token, and C is a predetermined constant larger than zero.

1           25.   The speech recognition system of claim 15, further comprising:  
2                   a speech recognition engine comparing input speech with the tokens and  
3                           generating confidence scores corresponding to the tokens based  
4                           upon comparison, the speech recognition engine modifying the  
5                           confidence scores based upon the assigned weights.

1           26.     The speech recognition system of claim 25, wherein the speech  
2     recognition engine modifies the confidence scores by multiplying the confidence scores  
3     with the assigned weights.

1           27.     A computer program product stored on a computer readable medium and  
2     adapted to perform a method of providing weighted grammar for speech recognition in a  
3     vehicle navigation system, the method comprising:

4                 receiving tokens in grammar for speech recognition;  
5                 receiving geographical information corresponding to the tokens; and  
6                 calculating weights corresponding the tokens based upon the geographical  
7                 information.

1           28.     The computer program product of claim 27, the method further  
2     comprising:

3                 receiving location information indicating the location of a vehicle for  
4                 which the vehicle navigation system is used, the weights being  
5                 calculated based upon the location information as well as the  
6                 geographical information.

1           29.     A computer program product stored on a computer readable medium and  
2     adapted to perform a method of speech recognition in a vehicle navigation system, the  
3     method comprising:



4 receiving tokens in grammar and weights associated with the tokens, the  
5 weights being derived based upon geographical information  
6 corresponding to the tokens;  
7 comparing input speech with the tokens;  
8 generating confidence scores corresponding to the tokens based upon the  
9 comparison; and  
10 modifying the confidence scores based upon the received weights.

1 30. The computer program product of claim 29, wherein the weights are  
2 derived based upon the location of a vehicle for which the vehicle navigation system is  
3 used as well as the geographical information.

1 31. A speech recognition system for use in a vehicle navigation system, the  
2 speech recognition system comprising:  
3 a geographical information database storing geographical information;  
4 a grammar generator assigning weights to tokens in a grammar, the tokens  
5 corresponding to a part of an address and the weights being  
6 determined based upon the geographical information  
7 corresponding to the tokens; and  
8 a grammar database storing the grammar including the tokens and the  
9 assigned weights.

1 32. The speech recognition system of claim 31, further comprising:

2 a grammar selector for selecting part of the tokens and the associated  
3 weights stored in the grammar database, based upon a location of a  
4 vehicle.